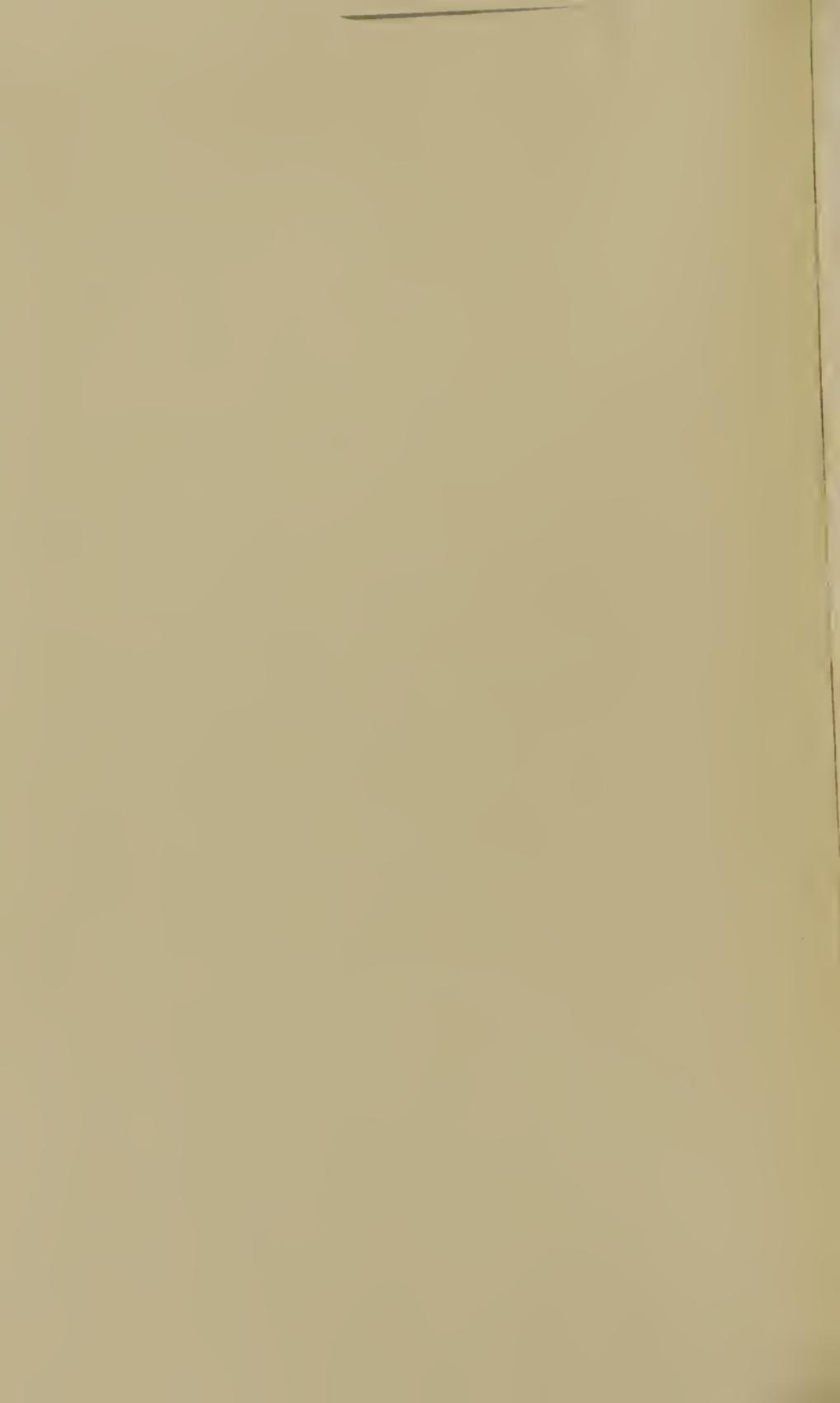


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A N
EXPERIMENTAL
BOTANICO-CHEMICAL ESSAY
ON
TWO NATIVE SPECIES
OF
LAURUS.

BY AUSTIN BROCKENBROUGH, JUN.
OF VIRGINIA:

HONORARY MEMBER OF THE PHILADELPHIA
MEDICAL SOCIETY.

Eye Nature's lofty and her lowly seats,
Her gorgeous palaces, and green retreats;
Pervade her lab'rinsts with unerring tread,
And leave for future guests a guiding thread.

DARWIN'S TEMP. NATURE.

14850

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1804.



AN INAUGURAL DISSERTATION

FOR

THE DEGREE

OF

DOCTOR OF MEDICINE:

SUBMITTED

TO THE EXAMINATION

OF THE

REVEREND JOHN ANDREWS, D. D. PROVOST,

(PRO TEMPORE)

THE

TRUSTEES, AND MEDICAL FACULTY

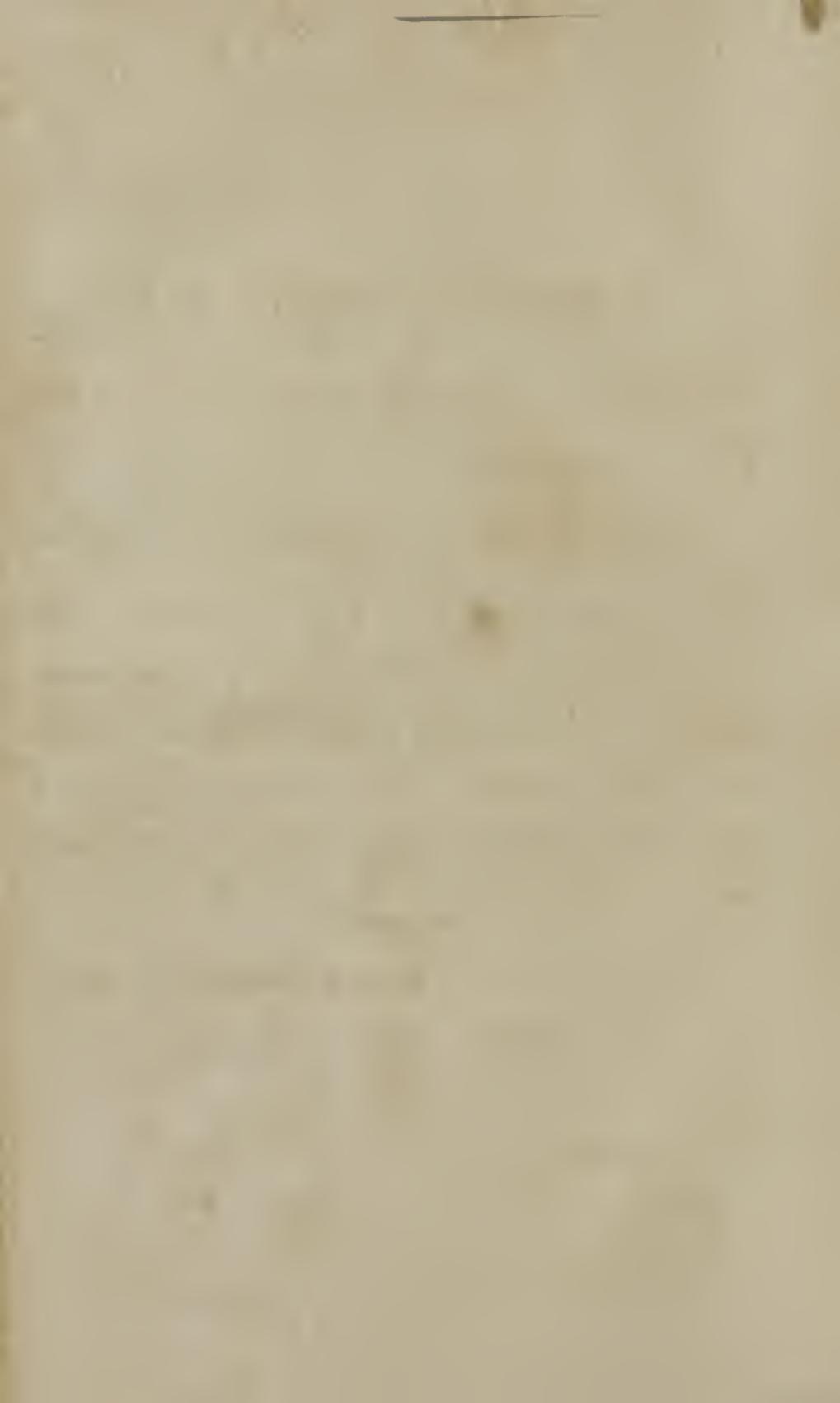
OF THE

UNIVERSITY OF PENNSYLVANIA,

ON THE 5th DAY OF JUNE, 1804.

Wendehall
With sentiments of
respect from
the Author

TO
DOCTOR JOHN BROCKENBROUGH, SEN.
OF TAPPAHANNOCK, VIRGINIA,
THIS
IMPERFECT DISSERTATION
IS INSCRIBED,
AS A
GENUINE TRIBUTE
OF
FILIAL AFFECTION, ESTEEM, AND GRATITUDE,
BY
THE AUTHOR.



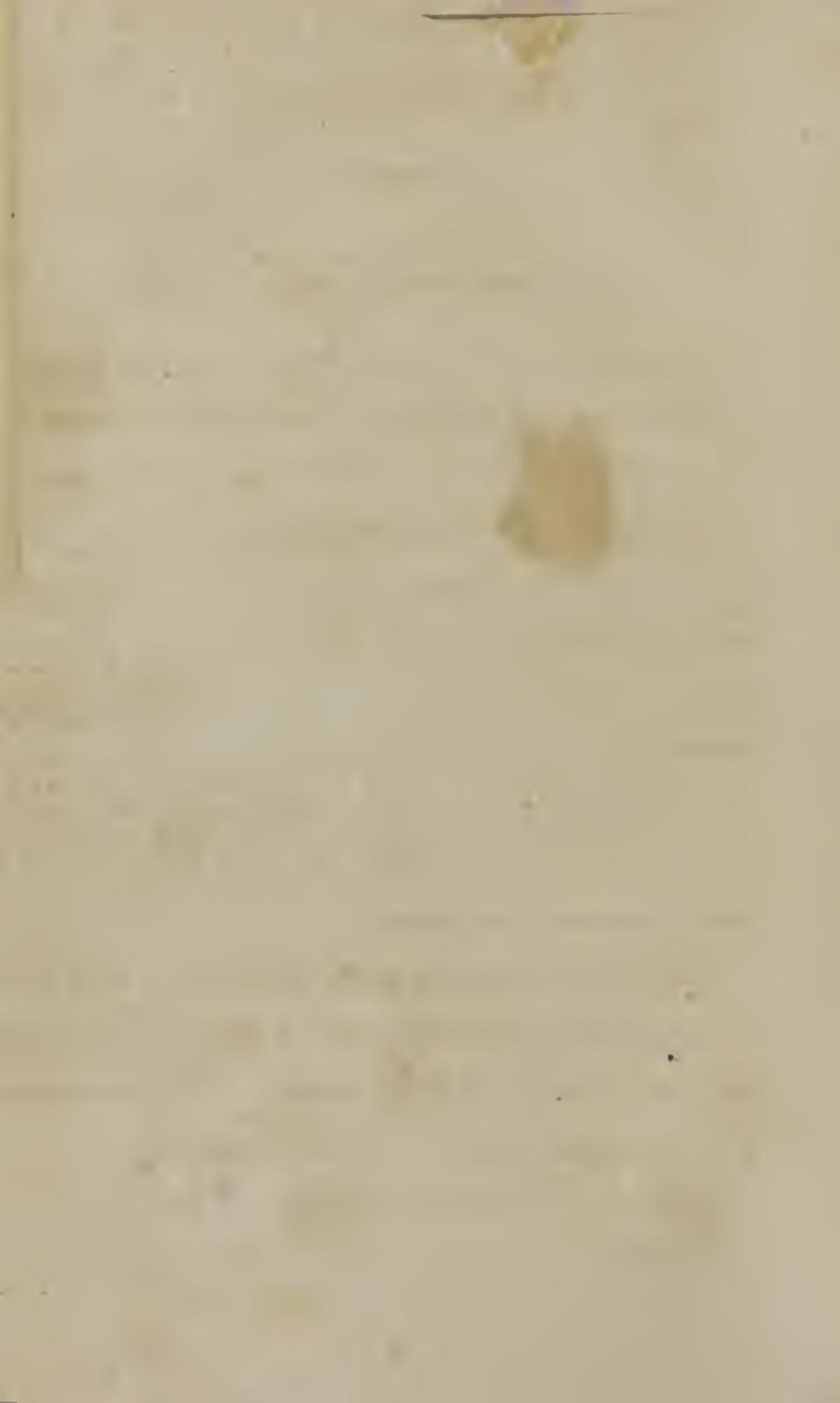
TO BENJAMIN S. BARTON, M. D.

PROFESSOR OF MATERIA MEDICA, NATURAL HISTORY, AND
BOTANY, IN THE UNIVERSITY OF PENNSYLVANIA.

DEAR SIR,

THE great veneration in which I hold your talents and your private worth, would have been sufficient inducements for this dedication, but the polite and friendly attention which you have invariably shown me doubly demands my highest compliment. With the warmest wish for a permanent restoration of your health, and for the reiterated success of your scientific labours, I am with esteem,

A. BROCKENBROUGH, JUN.



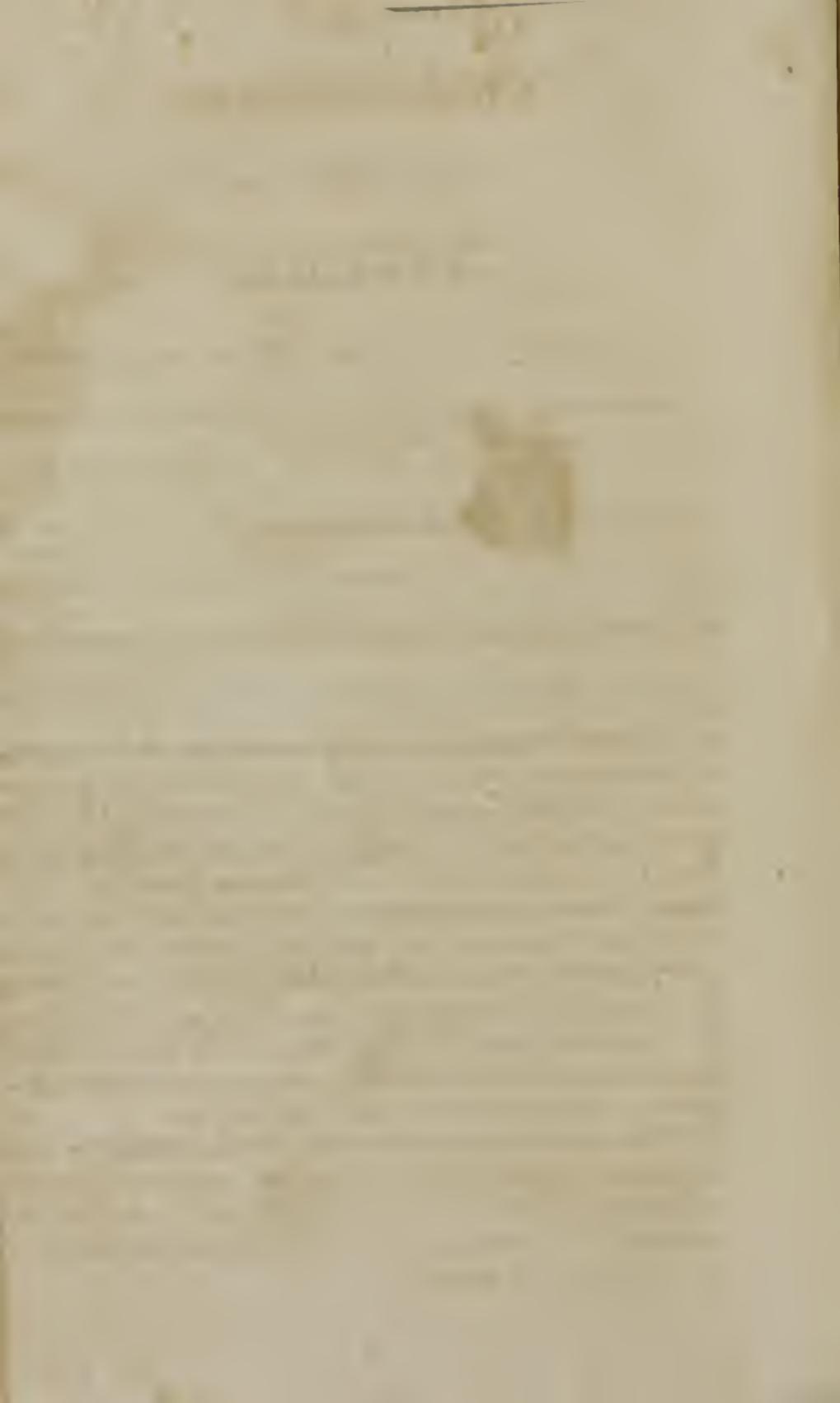
PREFACE.

Before mine eyes in opposition sits
Satirical Criticism.....my foe.

IF an apology can be admitted for the imperfections of a work intended to benefit society or afford amusement, I have a just pretension, who have neither of those ends particularly in view. The short time allowed by laws of the University for the production of a thesis; the difficulty and delay which an inexperienced experimenter must necessarily meet with; and the incorrectness which a juvenile novice must be guilty of in composition, are pleas too palpable—too forcible, not to meet with the utmost lenity. To the candid I address these observations—to these alone I submit these sheets for scrutiny.

The basis on which I rest the reputation of this work is inestimable truth: conscious of this, I feel composure in awaiting their decision: If I have departed however a single point from that strait line, it is through ignorance.

Error from this source forbids scorn.



OF THE
LAURUS SASSAFRAS
AND
BENZOIN
OR
LINNÆUS.

“Our native species of *Laurus* deserve to be investigated.”

PROFESSOR BARTON.

THE Genus *Laurus* is arranged by Linnæus, in the class ENNEANDRIA, and the order MONOGYNIA, of his sexual system. This genus likewise gives name to an order (*Lauri*) in the system of Mr. De Jussieu: It is the fourth order of his sixth class. Several important vegetables, both in a medical and domestic point of view, are species of this genus; such are *Laurus Camphora*, *L. Cinnamomum*, *L. Cassia*, *L. Caryophyllus*, *L. Myrrha*, *L. Cubeba*, *L. Sassafras*, and *L. Benzoin*. It is the object of this dissertation to offer an investigation of the properties of the two last mentioned species.

This genus is thus described by Linnæus, in his *Systema Vegetabilium*: “*Calyx*, nullus; *Corolla calycina*, 6 partita; *Nectarium*, glandulis 3, bisetis, *germen cingentibus*; *Filamenta interiora glanduli-fera*; *Drupa*, 1 sperm.”

I. OF LAURUS SASSAFRAS.

NATURAL HISTORY, &c.

THE Sassafras tree is well known to be a native of North America. The Europeans had no knowledge of it before the possession of the Floridas by the Spaniards in 1531, from thence the wood was imported into Spain about the year 1560, where it acquired great reputation for the cure of diseases.

It appears not to have been cultivated in England long before the year 1633, for in Johnson's edition of Gerard, he says, "I have given the figure of a branch taken from a little (Sassafras) tree, which grew in the garden of Mr. W."*

The Sassafras is generally of a small size. Marshall observes it rises sometimes to the height of twenty or thirty feet, and is about twelve or fifteen inches in diameter, but it is commonly of much less growth (as he likewise observes) particularly in the swamps of the northern states. A moist soil appears most congenial to its growth, as it most generally inhabits the borders of creeks and swamps. It sometimes attains to a considerable size, trees being found at least two feet in diameter, particularly on the Ohio, at Natches, &c. The bark of the young shoots is smooth and green, while that of the old trunk is rough, furrowed, and of a light ash colour: the leaves vary both in form and size, some being oval and entire, others cut into two or three lobes by deep incisions; they are all of a pale green colour, veined, downy on the under side, and placed alternately upon foot-stalks.† About the twentieth of April, the

* Woodville's Botany.

† The leaves of the Sassafras are deciduous in every part of North America. But Loureiro, who gives a place to this tree, in his *Flora Cochinchinensis*, says, that in that country the tree keeps its leaves the whole year. Tom. I. p. 254, 255.

tree puts forth small yellow flowers, which are produced in pendent spikes or panicles, that spring from the extremities of the shoots of the preceding year. This tree is generally dioicous; the male and female flowers growing on distinct roots.*

THE CHARACTERS OF THE FRUCTIFICATION.

CALYX is wanting.

COROLLA, six petals, these are narrow, convex, sharp pointed and of a dingy yellow colour. Nectarium consists of three tubercles, sharp pointed coloured, and ending in two bristles standing round the germen.

The STAMENS nine. Filaments shorter than the corolla, they are crowned with round antheræ. The braeteas are linear, and placed at the base of the pedicels.

PISTILUM: germen ovate. The style is simple, equal, and the length of the stamens. The stigma is obtuse and oblique.

Pericarpium, is a drupe, oval, sharp-pointed, and one-celled contained in the ealyx. When ripe, it is of a blue colour. The seed is a nut of a sharp-pointed egg shape, with a kernel of the same form.

This beautiful tree grows in various climates. It shuns, however, the coldest climates of North Ameriea, being rarely seen to the north of about latitude 44. In England, it has withstood the cold without much nursing. It extends to a low latitude in North Ameriea, and is found in the West-Indies. Catesby observes, That this fragrant shrub is the chief residence of the Tyrant Bird (*Muscicapa Corona rubra*) which usually builds on it. Parakeets and other birds are fond of eating the drupes or berries.

* According to Loureiro, the flowers are constantly hermaphrodite in Cochinchina. "In omnibus speciebus lauri (says this writer) in India a me observatis, inveni semper flores hermaphroditos." *Flora Cochinchinensis*, &c. Tom. I. p. 254.

SENSIBLE PROPERTIES.

THE Sassafras possesses a fragrant smell and a sweetish aromatic subacrid taste: the bark of the body is fungous, and of an ash colour, inwardly of the colour of rusty iron.

The root, wood, and bark, agree in their sensible and medicinal qualities; the bark of the root possesses those qualities in a more eminent degree, which led to the opinion of its greater efficacy. Hence it is mentioned in Pharmacopœias, as preferable.

The sensible qualities, which it so eminently possesses (over most other woods) gave origin and at the same time support to the idea, so generally entertained, of its utility in many diseases. Its medicinal character was formerly held in much greater estimation than at the present day. Whether this change of sentiment is founded on the ground of its being an inert medicine, or not, I shall inquire, with impartiality, in the course of this dissertation.

OF CHEMICAL ANALYSIS, &c.

I AM aware that there are opinions concerning the analysis of vegetables, which are inimical to that branch of science....But they are opinions preconceived, and are founded in error.

While many important advantages are to be derived from a science, shall we deem it useless?

Such advantages on the score of utility (putting out of the question the gratification afforded laudable curiosity) are very evident. There is in the first place no source which promises more to the arts, especially those of dying, painting, brewing, tanning and soap-making, which are yet capable of eminent improvement, and which, from an accurate analysis of vegetables, would derive daily improvement.

The sciences, particularly of botany and medicine, will be materially benefitted. The chemical analysis of vegetables, has justly been termed, "The study of botany in a practical sense." Botany promises important advantages...to study it, is to study nature: when in conjunction with the branch of science of which I am now speaking, its approach to the summit of perfection will be much facilitated.

The science of medicine appears to be materially connected with our enjoyment of life. What can there be more important and interesting in its progress? Every possible hope of improvement should be seized at with avidity, efforts the most unwearyed should be used. If this is acknowledged, should we pass by chemical analysis, which promises so much? I am not in this opinion of its advantages like the enthusiastic Paracelsus, impressed with an idea of discovering the immortal Elixer....God forbid at this enlightened day such folly. But the advantages I urge, would be, that the qualities of medicine would be better understood; that the pharmaceutical treatment would be improved, and that new productions highly important would be discovered.

EXPERIMENTS.-

IN the following analytical experiments, I used the bark of the root; at least it may be understood so, for as far as one experiment went, I was led to believe that the bark of the root, and that of the tree, showed no difference on analysis. The sensible properties of the former, are little more prominent than those of the latter, and the young twigs more than either: this, added to the more easily obtaining it, determined me to employ the bark of the root in the following experiments.

I. DISTILLATION.

1. Two ounces of the recent bark, in coarse powder were steeped twenty-four hours in two quarts of pure water, with the precaution of covering the vessel.

2. After this time, it was put in a glass retort, and a receiver adapted; moderate heat was applied, till four ounces of distilled fluid came over. This was nearly transparent and possessed faintly the peculiar flavour of the bark.

3. The heat was now increased to boiling point: in four hours the contents of the retort were reduced to a dry residuum. The second portion of distilled fluid found in the receiver, was nearly milk white; this extreme whiteness we attributed to the great abundance of essential oil, which swam in the fluid, and was so evident on its surface. Its odour was strongly that of the bark, with a warm, sweet, and pleasant taste.

4. On testing this last fluid with chemical agents, the following results occurred. Litmus paper, when dipped in it became red. With oxy-sulphate it formed a black precipitate...with pot-ash a flocculent soap.

Results....Essential oil, with aroma, gallic-acid, and an astringent.

Conclusions drawn. The first portion of distilled fluid, which came over, from gentle heat, was but slightly impregnated with the aroma of the vegetable, while the second portion was strongly impregnated; the tests likewise indicated the presence of gallic acid, an astringent, and an essential oil in great abundance.

These results evince that it requires a considerable degree of heat to raise the most volatile parts of this vegetable, while a degree perhaps not exceeding boiling point, elevates not only its aroma and oil, but an acid and an astringent.

These last named results, refute an opinion entertained, that essential oil was the only substance contained in vegetables, which prove volatile in that degree of heat.

II. INFUSION WITH HOT WATER.

1. Two ounces of the bark coarsely powdered, was put in a close vessel, to which four pounds of boiling water was poured. After the elapse of twelve hours, the infusion was decanted and the same quantity of boiling water was affused.

The first affusion was turbid and exhibited the appearance of much mucilage; a great portion of oil was diffused on its surface.

Its sensible properties were a red colour, strong aromatic smell, and a sweet taste. The second affusion possessed these characteristics in a less degree.

2. Results on chemical agents.

1. Inf. with litmus, red. Oxy-sulp. black. Pot-ash, soap.
2. do.....do.....brown.....do.

3. Analysis. One pound of the infusion after standing was filtered through porous paper. The clear fluid was evaporated till it acquired the consistency of a syrup: in this state, three parts of alcohol were poured on, when flakes were immediately formed.

ed ; by the addition of heat, these flakes increased, and they became numerous. When the liquor became cool, the flakes subsided, and were collected by decanting and straining. When dry, they weighed fifteen grains. The decanted fluid was now evaporated to the consistence of a firm extract, which was slippery between the fingers, and weighed when dry one drachm and twenty grains. This extract was redissolved in half an ounce of pure water : to this solution, vitriolic acid diluted with an equal quantity of water, was dropped in by small portions ; a coagulum became visible, this was obtained by decanting the supernatant fluid after its deposition. This deposit was nothing more than mucilage, and when dry weighed one drachm.

I thence conclude that a pint of boiling water extracts five grains of resin, thirty-five of gum, and one drachm of mucilage, from two ounces of this bark.

5. On evaporating a pint more to the consistence of an extract, it afforded me one drachm and forty grains of dark brown shining extract, bitter and astringent to the taste, also some fecula. Two ounces of alcohol were added to a drachm of this extract, the alcohol took up seven grains of it.

III. INFUSION WITH COLD WATER.

1. On four ounces of the same bark, coarsely powdered, was poured a gallon of pure water, which remained on twenty-four hours ; much oil swam on its surface, and it exhibited the appearance of much mucilage. It was decanted and a second infusion made. In this manner three others were made.

The first was of a red colour, aromatic, and sweet to the taste. The second stood thirty-six hours, its sensible properties were scarcely less prominent than the first. The third and fourth stood forty-eight hours under the same circumstances : their sensible properties were considerably diminished. The fifth possessed mucilage, but few or no sensible properties.

2. Chemical agents on them.

3 first Inf.	$\left\{ \begin{array}{ll} 1 \text{ With litmus, red. Oxy-sulphate, black. With Pot-ash, soap.} \\ 2 \dots \dots \dots \text{light red} \dots \dots \dots \text{purple} \dots \dots \dots \text{do.} \\ 3 \dots \dots \dots \text{no change*} \dots \dots \dots \text{do} \dots \dots \dots \text{do.} \end{array} \right.$
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3. Analysis. Two pints of each, of the three first infusions were strained and carefully evaporated ; they afforded the following results : the first soon after the application of heat, deposited one scruple of fecula, when evaporated to dryness afforded a residuc of one drachm and twenty grains. The second afforded fifty-five grains, with ten of fecula ; and the third, thirty-five grains of dark brown shining gummi-resinous extract, bitter to the taste, and astringent, as proved by the oxy-sulphate of iron ; partially inflammable.

4. On two drachms of the extract obtained from the infusion, was poured two ounces of concentrated alcohol, the solution became of a brilliant yellow colour ; one scruple and a half was taken up by the alcohol.

5. To this solution I added one ounce of distilled water, a precipitate immediately formed ; this was collected by a filter, but previously having evaporated it to one half, so that the precipitate was much increased. It weighed when dry, near a scruple.

This precipitate was bitter and astringent to the taste, burned readily, and produced a lambent flame.

7. On adding half an ounce of lime water to an ounce of the above solution, a white, opake, precipitate was formed, from which I inferred the presence of the oxalic acid.

8. On evaporating the fluid which passed the filter nearly to the consistence of a thin extract, it exhibited the appearance of curdles, it was slippery between the fingers, sweet to the taste, and not the smallest portion would now pass the filter.

9. That portion of extract which remained undissolved by the alcohol was soluble in twelve oun-

* The acid was now too weak to be detected by litmus.

ces of water, sweet to the taste, and with the addition of the alcohol of galls, became of a black colour.

10. The bark used in the infusion was dried. On chewing it, it still communicated a warmth to the mouth ; it was almost destitute of aroma. Alcohol digested on a small portion, possessed a degree of pungency and left the bark insipid.

Result....Fecula, gum, resin, mucilage in great abundance, oxalic acid and iron.

IV. TINCTURE WITH ALCOHOL.

1. Four ounces of the bark in powder were digested four days, with four of alcohol : it was then decanted, and a second affusion made. The first was warm and fragrant, quite aromatic, of a beautiful deep red colour, and stained both paper and linen, with some degree of permanency. The second affusion possessed those properties in a less degree.

2. Both those tinctures struck a black colour with the oxy-sulphate, and turned litmus paper red.

3. Two ounces were distilled in a small retort, with a gentle heat : The result was a distilled spirit, possessing the essential oil and aroma of the vegetable, nearly transparent.

4. On the same bark pure water was affused, after having been well washed ; it stood two days, at which time it possessed several sensible properties of the bark.

5. Analysis. On the evaporation of two ounces of the above tincture, a residue of thirty-five grains was obtained, this was of a remarkable bitter, but at the same time pleasant and astringent to the taste ; sparingly soluble in water, and inflammable.

6. One ounce of distilled water when added to four of this tincture effected a precipitate ; it however remained suspended in the supernatant liquor : this floccous precipitate increased on evaporation to two ounces, when one ounce of water was again added,

and the whole was filtered. I obtained one drachm of resinous matter.

7. On the evaporation of the fluid which passed the filter, eight grains of gummosous mass was obtained, which was slippery between the fingers, soluble in water, and sweet to the taste.

8. To this extract was added an ounce and a half of water, alcohol struck a black colour, and lime water procured a white precipitate.

The resin obtained from the tincture with alcohol was the subject of some future experiments. It possessed a remarkably fine agreeable bitter taste—a friend of mine thought it might be a useful article of the shops, as being a much purer bitter than most medicinal articles of that class, and far more agreeable.

V. IGNITION.

The bark used in the watery infusion, and which was afterwards subjected to the action of spirit, was burned ; pure water was then poured on the ashes, after standing the lixivium was decanted, and then evaporated. To this residue was added one ounce of pure water : Litmus paper dipped in it became brown. To a drachm of this solution in a wine glass, I added a few drops of the alcohol of galls, when a black colour was produced. To another portion was added a few drops of oxalic acid, when a white compound was formed.

Result....Pot-ash, iron, calcareous earth.

VI. FERMENTATION.

Two pounds of bark were put into an earthen vessel, and a gallon of boiling water was affused over it ; this vessel was left open : for six days it was exposed to an increased temperature, at which time a fermentation took place, which I suspected to be

acetous. To my regret I had not an opportunity of prosecuting this subject any farther.

OF THE OIL.

Few vegetable barks afford a finer essential oil than the Sassafras. The bark of the root is generally used for the purpose of obtaining it, since in it, it exists more abundantly ;* but every part of the tree appears to have large portions of it. Doctor Woodhouse has succeeded in obtaining it from the seed of the pericarpium. The oil is odorous and agreeable, pungent and warm ; when rubbed between the hands emits a camphorated smell : Camphor is said indeed to be one of its component parts. Dr. Barton appears to be fully impressed with this opinion, for he observes in his Collections, "I have been assured the oil of sassafras has been found an efficacious remedy, externally applied, in cases of wens. This looks probable, for our medicine is nearly allied to camphor." In the second part of his Collections he again observes, "I have made mention of the oil of this vegetable before, and have hinted at its affinity to camphor. The resemblance between the two articles is further evinced by this circumstance, that the oil of sassafras when externally applied to the body in rheumatic and gouty affections, is remarkable for its power of shifting the pain from its original seat."

While conducting the distillation, I had an eye to this opinion, but no camphor was discovered in the retort, therefore if any did exist, it must have escaped with the essential oil. To ascertain which the following experiments were made. Two ounces of the purest oil† which could be obtained, were dissolved in a proportionate quantity of alcohol, this

* Six pounds afford two ounces of oil.

† The oil of the shops is generally adulterated with turpentine, this fraud may be detected by rubbing a few drops between the hands, when the smell of turpentine will be discovered.

according to Hermstæat is capable of combining with the camphor as well as the oil: this solution was diluted with twelve parts of rain-water, the alcohol gradually combined with the water, the oil occupied the lower part of the vessel, and the diluted alcohol now swimming at the top, exhibited a milky appearance. This was now allowed to rest for three days, during which time there was a gradual precipitation on the oleaginous surface, in the form of a white powder.

In order to obtain the precipitate, this fluid was carefully decanted and the remaining portion filtered, several grains of concrete substance were obtained from the paper. This substance was white, somewhat unctuous to the touch, aromatic, acid to the taste, yet accompanied with a sense of coolness to the tongue like camphor, inflammable, and swam in water. So far bore this precipitate the characteristics of camphor.*

The oil from its extreme odour, kills insects. At several different times, insects, as flies, &c. were placed in a pill-box, and a few drops of the oil were likewise poured in; precautions were used to prevent their being covered or getting into the oil, for fear of stopping their respiratory organs. On stopping the box and placing it in the sun, in a few minutes they were found dead.

OF THE FLOWERS.

These make a very agreeable tea, which is preferred by some, to that made of the bark....They are odoriferous, sweet and pleasant: a decoction increases arterial action considerably.

* Professor Barton has been informed (which I adduce as an additional confirmation of this and the following facts) that the farmers in New Jersey and some other parts of the United States, think they derive much advantage from the practice of suspending, in different parts of their granaries, portions of the root of the Sassafras, in destroying, or rather driving away, the curculio, or weevil, which is so destructive to the wheat. Knowing, as we do, how extremely unfriendly the vapours of camphor are to various species of insects, there seems to be reason to suppose, that this practice has been found useful.

EXPERIMENTS ON THE HUMAN SYSTEM.

EXPERIMENT I.

TWO hours after breakfasting, I took twenty grains of the bark of the root in powder ; my friend, Mr. Darlington attending to my pulse. Natural standard seventy-two.

In.....5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, minutes,
Pulse beat 78. 80. 78. 78. 80. 79. 76. 74. 68. 66. 70. 68. strokes.

In.....65, 70, 75, 80, 85, 90, 100, 110, minutes,
Pulse beat 68. 74. 68. 70. 70. 68. 68. 72. strokes.

When first taken some degree of heat was excited in the fauces, and considerable nausea for the first five minutes. My pulse became softer on the tenth minute. On the twenty-fifth, soft, full, and flowing ; it was at this time at its height in frequency. On the fiftieth minute it became small and less soft : from this there was a gradual decrease, till it became perfectly natural. It is remarkable how the frequency of my pulse vibrated, after it had attained its height.

EXPERIMENT II.

The above experiment was repeated, with twenty-five grains, with results nearly similar.

EXPERIMENT III.

My friend and fellow-graduate, mentioned above, took, at 4 P. M. ten grains of resinous extract, his pulse being this afternoon at eighty. No change with respect to frequency took place for the first twenty-five minutes ; after which it was eighty-two. At

thirty-five minutes, took five grains more, when his pulse at 45 minutes beat 84—50...86—60...84—70...80—75...76—90...80. The uneasy sensations in the head, whieh Mr. D. was troubled with, this afternoon, increased considerably during the opera-
tion of the resin. On the thirty-fifth minute his pulse was fuller ; and on the fiftieth it was still fuller than natural.

EXPERIMENT IV.

Mr. D. at the same hour, on the succeeding day, favoured me by taking twenty grains of the pure resin, suspended as a solution ; his pulse being seventy-
two.

In.....5, 10, 15, 20, 25, 30, 35, 40, 45, 50 55, 60, 65, 75, Minutes.
Pulse beat 76. 80. 82. 80. 76. 74. 72. 76. 74. 74. 70. 70. 72. 72. Strokes.

In ten minutes it beeame fuller than natural, whieh continued to the twenty-fifth minute. Nausea was considerable.

The resin used in experiment 3, was taken in a solid form, while the pure resin used in the above, had an immediate operation by being held in a gum-
mous solution.

EXPERIMENT V.

Half a pint of boiling water was poured on two oun-
ces of the bark in coarse powder ; when cool, I took two ounces, my pulse beating eighty, Mr. Hoskins attending to it.

In.....5, 10, 15, 20, 25, 30, 35, Minutes,
Pulse beat 88. 90. 94. 96. 94. 80. 80. Strokes.

It beeame full in five minutes ; in ten, full and quiek, in fifteen more full and active, giddiness attended me also : after this my pulse gradually de-
creased to a healthy point. Perspiration was also in-
dueed.

EXPERIMENT VI.

I took twenty grains of the gummosus extract in a watery solution, this excited some degree of nausea, but had no sensible operation on my pulse.

EXPERIMENT VII.

I took ten drops of the essential oil on a lump of sugar, at ten o'clock, A. M. my pulse being seventy-two; in five minutes it beat seventy-six and softer, in fifteen minutes the same. Took ten drops more; in 20 it beat 80—30...82—35...78—40...76—45...76, ten drops were again taken; at 50 minutes it beat 80—55...82—60...78. After this it continued vibrating for twenty minutes, when it became natural. My pulse was much fuller throughout the operation; I felt some degree of hilarity and a propensity to motion during the first operation: these sensations were succeeded by the most disagreeable nausea imaginable, heaviness, and listlessness—they vanished however after a full meal.

EXPERIMENT VIII.

My friend and fellow graduate, Mr. Hoskins, half after ten, A. M. took twenty drops of the oil, his pulse being eighty-two.

In.....5, 10, 15, 25, 30, 35, 40, 45, minutes,
Pulse beat 86. 88. 88. 86. 82. 82. 80. 82. strokes.

In ten minutes much fuller, and attended with some giddiness. After the first operation of the oil had subsided, Mr. H. felt nearly the same disagreeable sensations that visited me, perhaps they were more prominent than those of mine, for they impressed him with an idea of there being something delirious in the oil.

EXPERIMENT IX.

My friend and fellow graduate, Mr. Camp, three hours after breakfasting, took thirty drops of the oil ; his pulse attended to by Mr. Hoskins, beating seventy six.

In.....5, 10, 15, 20, 25, 30,* 35, 40, 45. 50, minutes,
Pulse beat 80. 88. 100. 102. 106. 106. 95. 90. 88. 84. strokes.

In.....55, 60, 70, 80, 100, minutes,
Pulse beat 80. 78. 74. 70. 76. strokes.

From the fifth to the thirtieth minute his pulse became fuller, and his spirits much elated ; somewhat giddy...thirty-eighth, head-ache, a flushing of the face, and heat over the body. No account was taken from the eightieth to the hundredth minute. These symptoms gradually subsided, when, as in the two preceding experiments, very disagreeable sensations succeeded, with the addition of retching.

REMARKS.

Some of my acquaintances suggested the probable inaccuracy of the above experiments, particularly of the ninth : but they were made with the greatest accuracy, and their results were by no means anticipated; so far from this, they created surprise. Do they not prove that sassafras is an incitant of no inferior grade ?

Professor Barton has placed it under the head of general stimulants. Its most prominent action appears to be on the sanguiferous system, as is evinced by the increase of frequency and fulness of the pulse, also by the consequent elation of spirits and flushing of the face.

* This is six strokes higher than Dr. Alexander raised his pulse by taking a scruple of camphor.

This conclusion of the action of sassafras on the human system, is warranted also by facts, which will perhaps have more weight with my readers. Professor Barton in his "Collection for an essay towards a Materia Medica," says, "I know a woman, in whom an infusion or tea of the sassafras always induced an oppression at breast with sighing, and depression of spirits: she was a stout and seemingly healthy woman. She informed me (continues the doctor) that a lady of her acquaintance was affected in the same way by this tea."

Doctor Cullen appeared well acquainted with this action of sassafras. He observes, "that one of its effects on some constitutions, is to produce headache from its extreme fragrance."

From the results of my experiments already detailed, and from the facts which corroborate them, is it irrational to conclude this article to be an incitant of a higher grade, than many medicinal articles now in use? For instance, the Peruvian bark. Thirty grains of this, increases the pulse only six strokes,* while twenty only of the sassafras increase it eight. It is true, the resin and gum of the last mentioned article do not produce such prominent effects in the pulse, but in neither of those do I consider its active properties to reside.

In what then does its active principle reside?

From the seventh, eighth, and ninth experiments, we must conclude it to reside principally in the oil. Doctor Cullen's recommendation of the decoction of sassafras, to prevent the effects spoken of above, "as being less liable to affect the head," appears as if he had some knowledge of the active property of the oil.

Doctor Barton has observed that the oil resembles in its effects, or has an affinity to camphor, which article is indubitably a stimulant.

* Dr. Walker's Inaugural Thesis.

SASSAFRAS AS A MEDICINE.

Coeval with the discovery of America, we mentioned, that sassafras had been used as a medicine. For a long period after its introduction, it was highly valued as such...At that day the popular opinion was extravagant as to its virtues, even *Materia Medica* writers valued it as a remedy in many diseases, and in most stages of such diseases...They nominated it a corroborant, a diaphoretic, a demulcent, and recommended it as a sweetner in scorbutic, venereal, cachectic and catarrhal disorders ; besides many other diseases enumerated in that labyrinth, *Nosology*. That any one medicine should be so universal a remedy, is, I believe, beyond our comprehension. That it should disappoint therefore, in ninety-nine cases out of an hundred, is not to be wondered at. That a medicine so recommended with such little latitude, should often be employed in very different diseases, and in different states of the same disease, is to be expected ; hence its failure...hence the disrepute in which it has fallen.

When I commenced this dissertation, my ideas of the virtues extended no farther than the popular opinion concerning it. I had associated with its name, the idea of an old woman's medicine. The results of my experiments convinced me that I had fallen into an error ; that so far from being an inert medicine, it is a powerful incitant, and that its active principle bore considerable resemblance to camphor (as was supposed by professor Barton.)

Having thus obtained a just notion concerning its powers, I could then conceive that it might be applied as a useful medicine. Under this impression (founded on something more than supposition) I shall proceed to speak of it in disease.

IN THE INTERMITTENT FEVER.

The willow, the poplar, dogwood, &c. have been used in this disease with success ; indeed the sassafras has been used by old women as a remedy, with what success I cannot say, although I can conceive it possible and even probable with happy effects, for it evidently increases arterial action almost specifically, and it possesses an astringent property : These are no contemptible qualities.*

Hoffman used the resinous extract (spoken of before) he says with remarkable success in strengthening the tone of the viscera in the decline of intermittents.

In hypochondriasis, Hoffman observes, he has likewise given the extract with success in the spasms which attend it.

OPHTHALMIA.

The pith of sassafras has been used in ophthalmia by very celebrated physicians. If bruised and added to water, it makes a bland mucilaginous solution. This solution may be applied (by a bit of linen rag dipped in it) in every stage of this inflammation. It is without doubt the best local application which can be applied in an inflammation of the eyes. By its cooling sheathing property, it assists depletion very much in the cure...Dr. Physic extols this remedy highly in his lectures.

IN TYPHUS.

It is not chemical to suppose that the oil might be used with advantage in this disease. Its affinity to camphor and its stimulating effect at once render it probable.

* Woodville says the bark in powder has been used with success in intermittents.

IN RHEUMATISM AND GOUT.

The oil of sassafras when externally applied to the body in rheumatic and gouty affections, is remarkable for its power of shifting the pain from its original seat ; but not always to the advantage of the patient. " Like camphor therefore, it ought ever to be used in such affections, with great caution. I believe, however, that it is a medicine well adapted to many cases of rheumatism, in its chronic stage ; though even here it may prove injurious." Professor Barton.

In Lumbago it has been used by rubbing it on the part.

BRONCHOCELE.

The oil of sassafras has been used with advantage in bronchocele, probably from its affinity to camphor.

In confluent small pox, the oil might be used to prevent injuries done to the eyes.

Sassafras decoction or tea has been used in large quantities as an assistant in a course of mercurial and antimonial alteratives... The root and flowers have long been used as a sudorific.

Dr. Graves* speaks of it as a stimulant, aperient, and diaphoretic. Dose from $\frac{9}{i}$ to $\frac{3}{i}$ —decoction $\frac{3}{ss}$ to $\frac{3}{i}$, bis die.

The oil* has been the only officinal preparation used for some years, given in the dose of from two drops to ten. Sassafras is an ingredient in the decoction sarsa-

* His Pocket Conspectus.

* The oil when rubbed on the head, has been found useful in killing lice. The bark, especially that of the root, powdered and mixed with pomatum, has the same effect ; does not this imply something active ?

perillæ compositum and decoctum lignorum... The first preparation is well known to be used in cutaneous diseases and in some disorders of the breast, particularly in phlegmatic habits.

Watery infusions made both from the cuticle and woody parts rasped and shaved, and the flowers; are commonly drank as tea ; this is preferred by some to India tea : indeed we often meet with it at the tables of all classes of people.

This tea is said to promote obstructed catamenia.

TOOTH-ACHE.

Of the various species of essential or aromatic oils which have been used with advantage in the disease of tooth-ache, especially when it originates from a caries of the tooth, perhaps no one has been more beneficially employed than the oil of sassafras, repeatedly applied to the part more especially affected.

I wish not to swell this thesis, by enumerating the probable efficacy of sassafras and its preparations in diseases...nor of the lengthy detail of virtues spoken of by the ancients ; but the grand object being established, viz. That it is an incitant, and having spoken of its properties in known cases of disease, I finish these observations with a hearty wish for the introduction of so agreeable, and so acceptable a medicine (if efficacious) into general practice.

II. OF THE LAURUS BENZOIN,

THE BENJAMIN TREE, OR SPICE-WOOD.

THE *Laurus** Benzoin of Linnæus is a shrub which grows naturally in moist places, and rises often to the height of eight or ten feet. It is divided into several branches. The leaves are annual, oval-shaped and entire. The flowers are produced from the sides of the branches upon short foot-stalks, often dividing and sustaining from one to four or five flowers of a greenish yellow colour, which are succeeded by oval, oblong berries, of a red colour when ripe, but changing to black. The bark, berries, &c. have a strong aromatic smell, much like that of the Benzoin; indeed, by some it has been supposed the tree from whence it is produced.† This shrub grows in every state of the Union, and may be found abundantly in low moist situations.

LINNÆAN ARRANGEMENT, &c.

Under the head of botanical arrangement, section first, it was mentioned that the *Laurus Benzoin* came under the class and order of Enneandria Monogynia. Under the same head the characteristics of the genus were mentioned: neither does it seem necessary to give a more particular description of the fructification.

CHEMICAL EXPERIMENTS

ON THE BARK OF THE ROOT, AND BARK OF THE TREE.

EXPERIMENT I.

Two ounces of each of the barks above-mentioned were subjected to distillation in different retorts,

* Called in Virginia, Spice-Wood, and Wild All-spice Bush.

† It is now, however, ascertained that the substance called Benzoin is the produce of the *Styrax Benzoe* of Dryander.

with a quart of water. The fluid remaining in each receiver after the operation, was somewhat coloured, possessing the aroma of the vegetable, with a warm taste: neither produced a change with vegetable blues, or with oxy-sulphate.

EXPERIMENT II.

A quart of water was put in two separate vessels, marked A and B. In the vessel marked A two ounces of the bark of the root in coarse powder were put, and the same quantity of the bark of the tree in the vessel marked B: Having stood twenty-four hours, each was decanted, and the same quantity of water was affused: in this manner others were made, till affused water was no longer able to extract any active quality. The first infusion was of a green colour, aromatic, and warm; but the fluid from the vessel B was by far the most prominent in these characteristics. Three other infusions which were made differed only as to degree in the above sensible properties. Chemical agents, as litmus and oxy-sulphate, produced no change.

Each of the first infusions on evaporation afforded three drachms of a green bitter extract, soluble partly in alcohol and partly in water, inflammable. When in solution with alcohol, it struck a black colour with the alcohol of gall.

EXPERIMENT III.

Two ounces of each of the above barks were made into a decoction with a quart of water: this decoction exhibited a muddy appearance, possessing a great degree of warmth and pungency...a pint on evaporation afforded a gummi-mucilaginous extract, slippery between the fingers.

EXPERIMENT IV.

Upon one ounce of each of the above barks were poured four ounces of pure alcohol: on examination

on the fourth day, it exhibited a green colour ; this colour was communicated to paper, linen, and silk very readily.

On evaporation, these solutions afforded a green bitter resin, which, with a solution of the oxy-sulphate, struck a black colour with the gallic tincture.

EXPERIMENT V.

Each bark, separately burned in the open air, yielded ashes, to which warm water was added. The water being filtered, and evaporated to dryness, produced a small quantity of pot-ash, iron, and some silecious earth.

OF THE USES OF THE BENZOIN.

In a domestic point of view this may justly be considered a useful acquisition. It is said, upon good authority, that "during the late American war, necessity drove the inhabitants in many parts of the United States, to seek for a substitute for some of the spices to which they had been accustomed. They used the dried and powdered berries of the Laurus Benzoin (which we have before called spice-wood) and found them a tolerable substitute for allspice, hence the name Wild Allspice."

Was this shrub properly attended to, I have no doubt but it would become a valuable substitute for foreign spice ; and any substitute which approximated much less to them than this, would be an important consideration, inasmuch as its use would be more economical.

I am informed that travellers and even the inhabitants of the western country (remote from oriental luxuries) after the fatigues of the day, resuscitate themselves by a tea made of the young leaves or shoots of the Benzoin....the young leaves are preferred.

As a medicine...the few opportunities which were afforded me, while engaged in this dissertation,

would not warrant my trying any experiments on the human system, either in the healthy or diseased state.

But, from some facts which I have heard of its operation, I have concluded it to be a stimulant. Dr. Barton places it under the head of general stimulants.

A decoction of the small twigs makes an agreeable drink in slow fevers, and is much used by the country people. It is said the Indians esteem it highly for its medicinal virtues.

Having finished this essay, I can only add, that it would have afforded me more pleasure if the investigation into the properties of the vegetables I have treated of, had been more extensive, and the opinions I have formed, had been more unquestionable... But having already, in my preface, laconically assigned reasons for the numerous imperfections, I shall not enlarge on them here, but rest satisfied with the consciousness of having done all, that the time and opportunity allotted could afford. Although my subject to a majority of readers may not be interesting, yet I flatter myself those who are impressed with the importance of an investigation of the properties of our native productions, will not find this dissertation totally destitute of entertainment, or of usefulness.

It yet remains for me to tender my grateful acknowledgements to you, illustrious Professors, for the many important advantages I have derived from your lectures and your private communications.— Every student who has had the good fortune to visit this University, must feel the liveliest sense of gratitude for your anxious solicitude and unwearied exertions to instruct..... May your arduous labours be ever crowned with success, and may you long continue to diffuse medical knowledge, and its concomitants through this happy and free country.



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